was peculiarly his own in conception and organization, he died on August 19, 1887.

In selecting material for the chapter on Appreciations from the large assortment of available data, Dr. Dall has exercised admirable discrimination. It may not be inappropriate to quote therefrom an extract from a biographical memoir presented to the National Academy of Sciences by Dr. John S. Billings in 1889:

"The two men who have exerted the strongest influence upon natural history studies in this country are Louis Agassiz and Professor Baird. In many respects they were very unlike; circumstances gave them widely different fields, and they worked on different plans and by different methods. They began their public career in this country almost together; but Agassiz was already famous, as the result of seventeen years' work, while Baird was an almost unknown youth. Agassiz was a born teacher, a fascinating lecturer, gifted with eloquence which won its way everywhere; Baird could only speak freely in the presence of a few, and for the most part taught only by the pen and by example. Each of them created a great museum in spite of many obstacles, the first winning the means largely from private contributions, which were a tribute to his eloquence; the second gaining his end more indirectly, through his connection with the Smithsonian Institution and the government. Each of them gathered around him young men who were stimulated and encouraged by his example, who followed his methods, have continued his work, and have taught others, so that there are now observers and workers almost everywhere. The first made great use of the microscope and of embryology; the second very little, for he had to use the material available. The first had a vivid imagination which led him to frame many theories and hypotheses to be verified or disproved by future investigation and research; the second classified the facts before him, but theorized very little. Professor Baird's career as an original investigator was hampered and finally stopped by his administrative work, but in proportion as this latter increased he was able to furnish materials and opportunities for others. The pupils of Agassiz and Baird are the working naturalists of to-day and the teachers of those who are to come, and the two methods of study are being combined and developed to produce results of which we already have good reason to be proud, and the end of which no man can see.

"Upon the roll of the illustrious dead of the National Academy of Sciences his name stands out as that of a scientific man of high attainments, uniform purpose and indomitable energy, whose work has already added to the comfort and pleasure of hundreds of thousands of his fellow men, and bids fair to be a most important factor in supplying the necessities of millions yet unborn."

The merit, the charm, the permanent literary and historical value of this noteworthy volume can not be told in a review such as this. The work is no mere formal biography. It is a sympathetic analysis of the aspirations and labors of one friend by another; it is an appreciation of the work of one scientist by another; it is a simple, dignified, forceful narrative by one whose personal knowledge of the man and his times gave him a right to supplement the statement of facts with authoritative comment and criticism.

To those who knew Professor Baird, the volume of Dr. Dall comes as a delightful memento. To those contemporaries who had no personal acquaintance with him, it serves as a faithful record of one whose name and work are well known to all. To the generation that has come into being and reached maturity since Professor Baird's death, it is a fascinating history and an inspiring revelation.

Hugh M. Smith

Woods Hole, Mass.,
August, 1915

Chemical Technology and Analysis of Oils, Fats and Waxes. By Dr. J. Lewkowitsch. Edited by George H. Warburton. Fifth edition, entirely rewritten and enlarged. Volume III. New York and London, Macmillan and Co., Ltd. 1915. Pp. 483. Price, $6.50.

This volume deals with the technology and industries of the products named, and their analysis, also with the testing of lubricating oils and greases, soaps, glycerine and candles. A very important chapter is that on the waste oils, fats and waxes, and the products derived therefrom.

The reviewer knows of no treatise which deals so thoroughly with this phase of the subject. The contents have been increased by about twenty per cent., the principal additions being made in the sections upon the examination of butter, hydrogenated fats, varnishes, candles and soap. The work is encyclopedic, no omissions being noted, and indispensable to those having to deal with these compounds, or industries, which are among the most important. The reviewer would again take the opportunity to urge the inclusion of an index in each volume, as much increasing its consulting value.

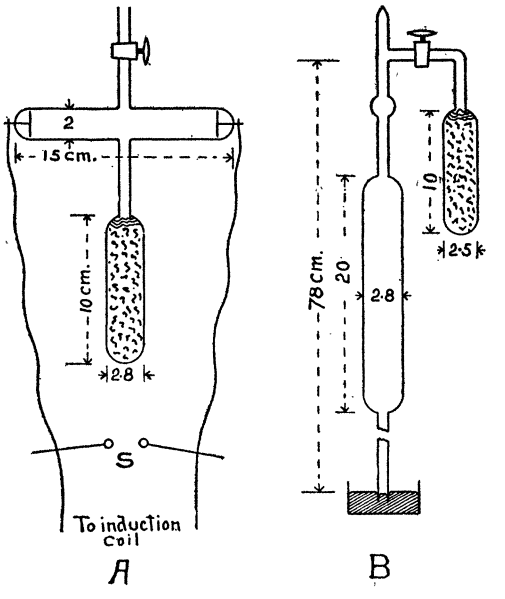
A. H. GILL

SPECIAL ARTICLES

THE ABSORPTION OF AIR BY CHARCOAL COOLED TO THE TEMPERATURE OF LIQUID AIR

THE remarkable absorption of certain gases by charcoal cooled to the temperature of liquid air, first pointed out by Ramsay and Soddy, may be exhibited conveniently by either of two simple pieces of apparatus. The first (*A* in the figure) makes use of the electric discharge as an index of the degree of absorption; while the second (*B* in the figure) indicates the absorption by the barometric column supported in a vertical tube dipping into a bath of mercury.

The general form and dimensions of the discharge-tube and its attached charcoal bulb are indicated in *A*. The volume of the charcoal used should be approximately equal to that of the discharge tube proper. A vent closed by a valve is included. For the experiment to be in its best form the cocoanut charcoal should be freshly burned, and to prevent undue absorption of air when not in use the tube should be partially pumped out and the valve closed. The connections are made as



shown in the figure, in which *S* is an alternative spark gap of about one centimeter length in parallel with the discharge tube. Any induction coil about the laboratory will answer. To operate, open the valve, then close it tightly, thus allowing the pressure within the tube to become atmospheric. On starting the induction coil the spark will pass at *S*. Now gently submerge the charcoal bulb in liquid air. In about one minute the spark at *S* will begin to weaken and a stringy discharge will appear between the electrodes of the discharge tube. Soon the spark at *S* will cease while the tube will be filled with the characteristic Geissler tube glow. In about four minutes the walls of the discharge tube will begin to flouresce, due to the bombardment of cathode rays. The intensity of this fluorescence will rapidly increase and soon the entire tube will be uniformly filled with a beautiful apple-green color. In about one minute more, five minutes from the start, the greenish color will begin to fade and sparking will *reappear* at *S*, showing that the vacuum in the tube is becoming "hard." In short the pressure may thus be reduced from atmospheric to about .001 mm. mercury in five or six minutes with no other agency than that of the absorption